

**Agenda Item:** I.A.2.

**DATE:** January 26, 2006

**SUBJECT:** University of Memphis, Master of Science in Computer Science

**ACTION RECOMMENDED:** Approval

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**BACKGROUND INFORMATION:** The fundamental advances in information technology today are largely the product of over 40 years of research mostly in the field of computer science and engineering. Nationally, research, scholarship, and instruction on computers occur principally in departments of Computer Science, Computer Engineering and, more rarely, in Computer and Information Sciences. Most comprehensive universities during the 1970s and early 1980s created full computer science degrees. In the late 1980s and 1990s, computer science became interdisciplinary and has continued to grow into free standing programs granting specialized degrees. Every major comprehensive university in the nation today, including the peer institutions, offer masters programs in Computer Science prepare professionals in information technology, research, and applications.

The University of Memphis has offered a strong concentration in Computer Science for several years for masters' students; however this structure has been troublesome for students and faculty. The number of courses necessary for computer science expertise has grown beyond the number appropriate for a concentration. Graduates are truly computer science trained, but often have to explain and demonstrate their competencies in job interviews because their diploma identifies them as Mathematical Sciences majors. Finally, the high caliber of the programs and research of the faculty is invisible, as it is structured under the Mathematics designation.

While it is expected that the masters' degree will substantially increase the visibility and thereby attract more students to the program, the proposed program essentially constitutes a reorganization and extension of the existing concentration in the mathematics major.

**PROPOSED START-UP DATE:** Upon approval

Commission staff has reviewed program proposals according to the academic standards adopted by the Commission on November 14, 2002. Each standard is referenced below.

**1.1.20A MISSION:** The proposed program is consistent with the mission. The proposed program is consistent with the role and score of the university mission "to provide a stimulating academic environment for its students in an urban setting." The university, "through its research, teaching and outreach roles responds to individual needs, such as the support of health care and preventive health services."

**1.1.20B CURRICULUM:** The proposed curriculum for the Masters' program requires completion of 34 semester hours. There are no additional courses required to implement the proposed program.

<u>Courses</u>	<u>Credit Hours</u>
Core Requirements	6
Major Field Requirements	18
Electives	9
Computer Science Seminar	1

**1.1.20C ACADEMIC STANDARDS:** Admission requirements include the GRE, two letters of recommendation, minimum score of 550 on the TOEFL or 210 on the computer-based TOEFL (for students whose native language is not English), an undergraduate degree with a minimum GPA of 2.5 on a 4.0 scale, and prerequisites in mathematics.

#### **Projected Program Productivity**

Student Projections	Full-time Enrollment	Part-time	Graduates
Year 1	30	10	5
Year 2	32	12	10
Year 3	36	16	14
Year 4	40	20	16
Year 5	40	24	16

**1.1.20D FACULTY:** The Division of Computer Science now has fifteen full-time faculty members. Two members of Mathematical Science participate in the masters' and doctoral programs half-time and two from other fields will teach appropriate graduate electives. On occasion, adjunct faculty members (with terminal degrees in Computer Science) teach and guide students in their research; therefore, no additional faculty is required.

**1.1.20E LIBRARY RESOURCES:** The majority of the support for the proposed program will come from infrastructure facilities necessary to access resources electronically. Although the library at the University of Memphis and its branch library in Mathematical Sciences house over 100 journals in Computer Science-related subjects and is comparable to similar state universities, cutting-edge work in the field appears in conference proceedings that are available online, supported by the University of Memphis infrastructure. Departmental/Disciplinary collections in the University of Memphis McWhorter Library and in its Mathematical Sciences branch in the Dunn Building are adequate to support this program. There will be no special library costs for new acquisitions.

**1.1.20F ADMINISTRATION/ORGANIZATION:** The proposed program will be housed in the Division of Computer Science. The Board of Regents approved the formation of a new Computer Science Division in September 2000. The division was put in place during 2000-2001, with an independent budget for essential operations such as faculty, graduate assistants, and some operating expenses. The current director will continue in that capacity upon approval. The Division of Computer Science will be responsible for the content and administration of the new degrees. A one-fourth time position for a program coordinator will receive faculty release time.

**1.1.20G SUPPORT RESOURCES:** None indicated.

**1.1.20H FACILITIES/INSTRUCTIONAL EQUIPMENT:** No new instructional facilities are required, nor are any renovations needed. No new specialized instructional equipment is required to support the program. The facilities in place on campus are adequate. Updating processes are in place at the University of Memphis. The university has an instructional technology strategy that provides adequate lab support for computer science programs. External support will continue to be an integral part of support for the proposed program. Faculty received external funding in excess of \$3,000,000 in the last four years to support the creation and maintenance of several existing labs and facilities for instruction and research.

**1.1.20I STUDENT/EMPLOYER DEMANDS:** Current concentrations that appropriately prepare students in computer science are comparable to free standing Masters' degrees in computer science at peer institutions; however this structure puts students at a disadvantage for employment and the faculty at a disadvantage to garner external funds.

In Fall 2003, the computer science concentrations within the Mathematics program had 71 students in the M.S. program and 18 students in the Ph.D. program. Graduates of the bachelor's program in computer science are very likely to go for a graduate specialization because of substantially better salaries and enhanced career opportunities.

On the local level, business, industry, and government organizations in the Memphis area will benefit enormously from the research conducted by computer science graduates with masters' degrees at the UoM. In a broader context, the scarcity of highly trained computer scientists in Memphis is a well-known problem to the corporate world in the Mid-South. In general, the use of computers is increasing in every business and industry, and in almost every facet of our societal life, highly trained computer scientists are becoming ever more and more necessary.

**1.1.20J NO UNNECESSARY DUPLICATION:** There are preparatory undergraduate and associate degrees in several universities, four- and two-year colleges, but no M.S. program in computer science in Memphis. UoM has a bachelors' degree in Electrical and Computer Engineering; however, even a graduate program in ECE would have a different emphasis on hardware and engineering that would be substantially different degree from the proposed M.S. degree in computer science. While local programs may supply some of the skills required, none provide the level of scientific and technical education as do the proposed M.S., nor do they provide the number of professionals

needed by local business and industry. Finally, there will be a tremendous boost to the state's prestige in technical and business circles in Memphis and the tri-state region.

**1.1.20K COOPERATIVE INSTITUTIONS:** None indicated.

**1.1.20L DESEGREGATION:** The program will not impede the state's effort to achieve racial diversity.

**1.1.20M ASSESSMENT/EVALUATION AND ACCREDITATION:** Program assessment and evaluation are based on criteria that include validation of the projected and actual enrollment and graduation data; alumni follow-up surveys; student satisfaction surveys; and local area employer satisfaction surveys. The evaluation will be planned and overseen by a subcommittee of the computer science faculty.

**1.1.20N ARTICULATION:** N/A

**1.1.20O EXTERNAL JUDGMENT** (Graduate Programs): Dr. James Cross, Professor and Chair, Computer Science and Software Engineering at Auburn University and Dr. Conrad Cunningham, Chair Department of Computer and Information Science at the University of Mississippi provided the expert external reviews for the M.S. and Ph.D. They provided a thorough assessment of the proposed program, the curriculum, faculty and facilities. They were supportive of the readiness of UoM to implement the program, confirming that the programs were essentially being offered through concentrations without the advantage and benefits of the degree designation. In separate reports Dr. Cross and Dr. Cunningham both recommended that the TBR and THEC move forward to approve the programs.

**1.1.20P COST/BENEFIT/SOURCE:** The primary benefit will be to make graduates more marketable by conferring upon them a degree appropriately entitled computer science instead of mathematics. The proposed program also will enhance opportunities to increase enrollment, generate external funding and respond to the industrial and business community for computer scientists. No new costs are associated with the proposed masters or doctorate.

<b>Financial Projections</b>	Year 1	Year 2	Year 3	Year 4	Year 5
1. Expenditures					
A. One-time:					
New/renovated space					
Equipment					
Library					
Consultants	\$3,000				
Other					
<b>Total for One-time Expenditures</b>	<b>\$3,000</b>				

B. Recurring:					
Administration					
Faculty					
New					
Program Coordinator ¼ time	\$18,500	\$18,500	\$18,500	\$18,500	\$18,500
GAs	\$96,000	\$120,000	\$168,000	\$192,000	\$216,000
Staff					
Benefits					
Equipment					
Library					
Travel	\$4,000	\$4,000	\$4,000	\$4,000	\$4,000
Other					
<b>Total for Recurring Expenditures</b>	\$118,500	\$142,500	\$190,500	\$214,5000	\$238,500
<b>TOTAL (A +B)</b>	\$121,500	\$142,500	\$190,500	\$214,5000	\$238,500
2. Revenues					
State appropriations (new, FTE)					
*State appropriations (old)					
Tuition/Fees	\$193,032	\$235,928	\$262,738	\$300,272	\$316,358
Institutional Resources					
Grants/Contracts	\$12,000	\$24,000	\$24,000	\$36,000	\$48,000
Gifts					
Other (in-kind donations, etc.)					
<b>TOTAL REVENUES</b>	\$205,032	\$259,928	\$286,738	\$336,272	\$364,358

#### External Funding Support

It is anticipated that local industry and external funding sources are able to provide a good deal of support for the programs, both for instructional support, labs, faculty and staff.

The Computer Science faculty has a solid record of both seeking and receiving support from external, mostly federal, funding agencies. These include a number of grants from the National Science Foundation (NSF), the Department of Defense (DOD), the Office of Naval Research (ONR), and the National Aeronautics and Space Administration (NASA) as shown below. Funding has been sustained at an average rate of over \$1,000, 000 per year in the last three years that helps support faculty and graduate assistants. Currently received grants guarantee that this level of funding will be maintained for the next two years at least.

**1.1.30 POST APPROVAL MONITORING:** An annual performance review of the proposed program will be conducted for the first five years following approval. The review will be based on goals established in the approved program proposal. At the end of this period, campus, governing board, and Commission staff will perform a summative evaluation. These goals include, but are not limited to enrollment and graduation numbers, program costs, progress toward accreditation, library acquisitions, student performance and other goals set by the institution and agreed upon by governing board and Commission staff. As a result of this evaluation, if the program is found to be deficient, the Commission may recommend that the governing board terminate the program. Copies of such recommendation will be forwarded to the Education Committees of the General Assembly. The Commission may also choose to extend this period if additional time is needed and requested by the governing board.